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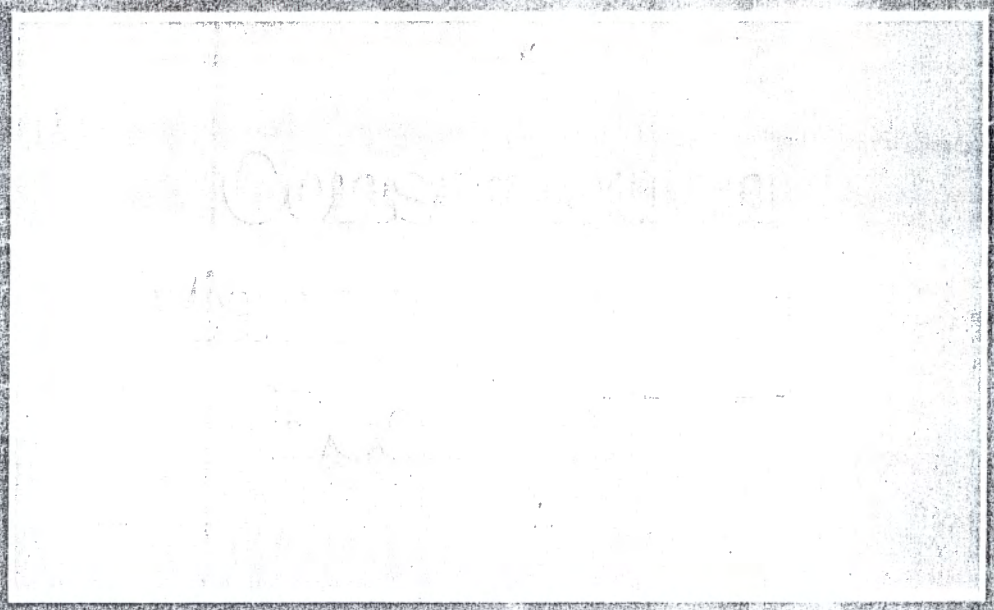

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The impact of non-financial incentives on bricklayers' productivity in Nigeria

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High productivity is regarded as a goal that ensures long term survival of firms. In Nigeria's labour intensive construction industry, firms are currently applying various non-financial incentive schemes aimed at improving operatives' productivity. A questionnaire survey involving the management and operatives of construction firms was conducted to determine the impact of these scheme on the productivity of bricklayers. The survey was complemented with on site observation and measurement of bricklayers' output on 40 construction projects in order to determine the impact of non-financial incentive schemes on productivity. Comparative analysis of sites with and without incentives showed that non-financial incentive schemes significantly improved bricklayers' productive time and these schemes accounted for 6% to 26% of the variations in output between the two sets of sites on block laying and concreting activities measured.

Keywords: Non-financial incentive, motivation, productivity improvement, bricklayers, Nigeria

Introduction

The construction industry in Nigeria is labour intensive; and it is the highest employer of the nation's work force. The industry also accounts for over 50% of the country's gross capital formation. Unfortunately most empirical studies have revealed that the output of the industry is quite low when compared with many developed countries. Workers' productivity on construction sites has been shown to be very poor and this has been the trend for a long time (Olubodun, 1986 and Ayandele, 1996).

Parts of the reasons adduced for this low productivity as given by Wahab (1977) are:

- Substantial rise in the demand thrust on the industry in the 1970's and early 1980's as a result of unprecedented increase in revenue from petroleum resources.
- Short supply of both man power and building materials.
- Complexity involved in the construction process.
- Enervating weather condition.
- Ineffective supervision.
- Absenteeism on a prolonged scale.

In the same vein, Ogunlana and Olomolaiye (1992), noted that on the average, workers spend approximately half of their working day, after allowing for lunch breaks and absences on productive work; while the remaining time is not spent directly on production but rather on waiting, receiving instructions and idling. Nwachukwu (1988), also observed that a large number of project managers and supervisors do not know how to identify operatives' goals and link them with organizational reward in order to motivate operatives. As a result, operatives get frustrated and productivity suffers.

Khan (1993), reported that the importance of human factors in management, including motivation in terms of provision of incentive schemes, was not well recognized until the famous Hawthorne studies were conducted in 1920's and early 1930's. The major implication of the Hawthorne studies was a change in management thinking that the work environment, the

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feeling of being part of something important and the satisfaction of having some control on one's own destiny could have a significant influence on productivity.

Ayandele (1996), categorized the variety of methods in which workers are motivated as fear of the supervisor and fear of losing a job, being part of the work itself, incentives, job satisfaction and discipline in terms of high site morale. Olomolaiye (1990), in his study on bricklayers' motivation in the United Kingdom concluded that motivation does not influence the rate of working. According to him, what influences or determines how fast a worker produces is more of a function of his equipment and skill.

Olomolaiye and Price (1989), argued that construction work contains some inherent intrinsic motivators. According to them in order to motivate workers, the management should provide a congenial working climate for motivators such as the work itself, feelings of accomplishment by the worker and recognition for efforts. They went further to assert that pay is a lower level motivator and should not be treated as a prime motivator. Adams (1963), proposed his equity theory of motivation, which is based on equal treatment of people. According to him, people in any organization have a tendency to compare their inputs and corresponding rewards with other people in the same rganization or even in other organizations. People compare their inputs in terms of education, experience, ability, effort and loyalty while they compare their rewards in terms of salary, promotion, recognition and social relationship. If a person feels under rewarded in comparison to others, the productivity of the person may go down and even he or she may quit the job. On the other hand, a person that feels over rewarded may get motivated and contribute more. Khan (1993) also reported that Skinner in 1953 advocated that monetary or non-monetary incentives (praise, recognition, promotion etc) after a desired behaviour increase the probability of the repetition of the desired behaviour. Whereas, punishment (disciplinary measures, fines etc) after an undesired behaviour decreases the probability of the repetition of the undesired behaviour.

A number of studies (Maloney, 1983; Borcherding 1976; Choromokos and Mckee, 1981; Borcherding *et al.*, 1982 and Callahan, 1984), have implicitly attributed low labour productivity to the presence of a number of demotivators (dissatisfiers). According to Koehn and Cook (1987), motivators (job enrichment) cannot manifest in improved productivity unless these demotivators are removed. Adeyemi (2000b) observed the presence of a number of demotivators in the Nigerian construction industry, which are clogs to productivity improvement. Those having direct bearing with operatives' motivation are identified as:

- Inappropriate tools and equipment breakdown.
- Materials shortage, delay and wastage.
- Incessant rework and estimating errors.
- Absence of training and safety programmes.
- Job insecurity/employee turn over.
- Non involvement of construction crews in production objectives.
- Incompetent foremen.
- Predominance of Maslow's theory X site managers.

The objective of this study is to determine the extent to which the current non-financial incentive schemes being operated by Nigerian contractors have influenced the productivity of a category of operatives-the bricklayers against the presence of these demotivators. Other trades are eliminated from this study so that data are task specific (Lewis, 1987).

Research methodology

Primary data were collected through questionnaire survey and direct field measurements/observations. The study samples were randomly drawn from construction firms within the three major geographical zones in Nigeria (southwest, southeast and northern areas). The construction firms surveyed were classified into large, medium and small firms. The essence of the classification was to ensure homogeneity of response and comparative analysis. The method of classification of the construction firms was based on their registration categorization with the Federal Ministry of Works and Housing in Nigeria.

Two sets of questionnaires were prepared on Likert type scale of zero to four to sample the opinion of two hierarchies of construction practitioners (the management and the bricklayers) in the three categories of construction firms to determine the:

- level of popularity of non-financial incentive schemes in comparison with financial incentive schemes.
- level of involvement of the management and the bricklayers in the introduction of incentive schemes to their organizations.
- premium placed on some identified variables of non-financial incentive schemes being operated by the firms.

Research assistants were employed to distribute and assist the bricklayers on site to interpret the questionnaires. It was assumed that the current crop of bricklayers in Nigeria have at least junior secondary school certificate or its equivalent and received formal training in blocklaying and concreting from either government

trade schools or any other acceptable apprenticeship programmes. Such background guarantees that apprentices are able to communicate (read, write and speak) fairly in English Language. In addition, the multi lingua nature of Nigeria has compelled craftsmen to be able to communicate well enough in English language, the country's lingua-franca, if they must have meaningful interactions within their work environment. This is even most essential in multi national construction firms where many of the professionals they interact with do not speak any of the local languages. This assumption was further tested and confirmed in the questionnaire to the bricklayers.

One hundred and seventy questionnaires were distributed to each category of respondents using stratified random sampling technique within the study areas. This is made up of 45, 55 and 70 questionnaires to the large, medium and small firms respectively. One hundred and five of the 170 questionnaires administered to the management were returned. Two of the questionnaires were not properly filled and were rejected leaving 103 questionnaires for analysis. As for the bricklayers, 118 questionnaires were returned but 103 were selected by balloting and used for analysis in order to conform in number with that of the management. The questionnaires were then grouped into the three categories of construction firms.

On site investigations and measurements were also carried out to determine the output of the bricklayers. Forty building and civil engineering projects being executed for various tiers of government, public institutions, corporate organizations and private individuals scattered around the study areas were selected in this regard. Thirteen of the sites were being managed by the large firms, 14 by the medium firms and 13 by the small firms. The actual production outputs in each of the identified activities per trade were measured using the method of observation of productivity of the end result of a key activity (for 8 – hours day). The decision to adopt this method was based on its wide acceptability over other techniques of measuring productivity on Nigerian construction sites. This is informed by the result of the earlier questionnaire survey which sought to know the premium attached to each of the five prominent techniques for measuring productivity. The bricklayers on each of the 40 sites were operating one labourer to two bricklayers gang and this uniformity in the gang size made comparative analysis easier.

The sampled sites are such that non financial incentive schemes are being employed in some, while such schemes are completely absent in some others. For comparative analysis, fifteen variables of non financial incentive schemes were selected. These are variables whose implementations are visible on site, and with high premium placed on each of them while responding to the questionnaires. These variables are:

- Provision of adequate working tools and equipment.
- Transport to and from site.
- Free medical treatment for the workers and members of their family.
- Provision of protective work overalls, helmet, eye goggles etc.
- Safety plans including the provision of first aid kits on site.
- End of the year party and award night.

It must be stressed that all these six schemes are being employed in twenty of these sites. These sites were numbered serially with Roman numerals I to XX and they will be referred to as sites I to XX. The remaining twenty sites in which none of the six schemes are being operated were numbered from XXI to XL and they will be referred to as sites XXI to XL. The productivity rates for each of the two groups of sites were measured and then compared.

The analytical tools used consist of:

- Relative index (RI); to determine the scheme that is more employed between financial and non financial incentive schemes, to rate the usage of the identified components of non financial incentive schemes, and to determine the most employed method of measuring operatives productivity on site. The relative index is given by:

$$RI = \frac{\sum_{i=0}^{n} PU_i}{Nn} \qquad (1)$$

where,
P = employment rating of a variable
U = number of respondents placing identical score on a variable
n = the highest attainable premium
N = sample size

- Student t statistics to determine whether the difference in the mean relative index of financial incentive schemes and non financial incentive schemes is significant.
- One way analysis of variance (ANOVA) test, to prove the null hypothesis that the mean RI in the large, medium and small size construction firms are the same. That is;

H_0: $\mu_l = \mu_m = \mu_s$
H_1: $\mu_l \neq \mu_m \neq \mu_s$

Criterion: Reject the null hypothesis if $F > F_{\alpha,v_1,v_2}$

Results and discussion

In order to identify the most widely used type of incentive schemes in Nigeria, questionnaires were administered to elicit data from management and bricklayers of large, medium and small construction firms within the study areas on the premium placed on the usage of financial and non-financial incentive schemes. The Relative Index (RI) of the premium for both management and bricklayers in the three categories of construction firms are shown in Table 1.

The table shows that non-financial incentive schemes with mean RI = 0.88 are more widely used in the three categories of construction firms surveyed than the financial incentive schemes with mean RI = 0.79. One tail t-statistics was used to determine whether there is significant difference in the mean relative indexes of the usage of these two schemes. The calculated value of t was 2.617. However, the critical value of t at 5% level of significance was 2.015. For $t_{calculated} > t_{critical}$ it was concluded that non-financial incentive schemes are significantly more employed than financial incentive schemes in the Nigerian construction industry. Table 1 also shows that both management and bricklayers' perception of the usage of both types of incentive schemes are similar. The relative index of premium placed on the usage of financial incentive schemes by the management of all categories of firms surveyed is 0.78 while it is 0.79 by the bricklayers. For non-financial incentive schemes, the relative index computed for the management of all categories of firms surveyed is 0.85 and 0.91 for the bricklayers. These differences in relative indexes are neither significant in the case of financial incentive schemes nor in the case of non-financial incentive schemes.

Attempts were made to identify the various non-financial incentive schemes being operated in the construction industry in the country and determine the premium placed on each of them. In all, 15 variables of non-financial incentive schemes were established as prominent and listed in the questionnaires.

Respondents were then asked to indicate the extent of premium they attach to each of the variables. The Relative Index (RI) of incentive premium placed on these variables by the management and bricklayers of the firms are shown in Tables 2 and 3 respectively. In each of the tables, the incentive schemes involving initial capital outlay are the first nine relevant motivators while the last six are those not involving initial capital outlay. The result of the ANOVA test on RI of the management (Table 2) indicates that $F = 5.19 > F_{0.05} = 3.23$ and similarly the result for the RI of bricklayers (Table 3) indicates that $F = 5.07 > F_{0.05} = 3.23$. In both cases therefore, the null hypothesis of equality in the means of RI of the large, medium and small firms was rejected and it was concluded that there is a significant difference

Table 1 Relative index of premiums placed on usage of financial and non-financial incentive schemes

Incentive schemes	Management				Bricklayers				Mean
	Large firms	Medium firms	Small firms	All firms	Large firms	Medium firms	Small firms	All firms	
Financial	0.90	0.72	0.74	0.78	0.89	0.76	0.72	0.79	0.79
Non-Financial	0.96	0.77	0.81	0.85	0.91	1.03	0.77	0.91	0.88

Table 2 Relative index of premium placed on the identified non-financial incentive schemes (management)

S/n	Relevant motivators	Large firms	Medium firms	Small firms	All firms
1.	Provision of working tools and equipment	0.87	0.68	0.41	0.65
2.	Employee training and development	0.55	0.36	0.17	0.36
3.	Recognition through praise for significant work done	0.74	0.76	0.74	0.75
4.	Encouragement to make suggestions about work	0.42	0.55	0.61	0.53
5.	Free medical treatment for workers	0.74	0.68	0.34	0.58
6.	Subsidized group/personal insurance against accident on site	0.40	0.39	0.31	0.37
7.	Transport to and from site	0.85	0.60	0.20	0.55
8.	Provision of protective work devices	0.72	0.63	0.16	0.50
9.	Supervision based on leadership by example	0.83	0.82	0.76	0.80
10.	Safety plan including provision of first aid	0.75	0.68	0.22	0.55
11.	Finish and go (no delay after day's work)	0.43	0.51	0.58	0.48
12.	Provision of recreation and relaxation centers	0.57	0.30	0.08	0.32
13.	End-of-the year cocktail party and award night	0.74	0.52	0.19	0.48
14.	Love and belongingness	0.74	0.77	0.75	0.75
15.	Job security	0.07	0.18	0.20	0.14

Table 3 Relative index of premium placed on the identified non-financial incentive schemes (bricklayers)

S/n	Relevant motivators	Large firms	Medium firms	Small firms	All firms
1.	Provision of working tools and equipment	0.82	0.63	0.24	0.56
2.	Employee training and development	0.55	0.31	0.17	0.34
3.	Recognition through praise for significant work done	0.71	0.75	0.74	0.74
4.	Encouragement to make suggestions about work	0.42	0.56	0.64	0.54
5.	Free medical treatment for workers	0.74	0.60	0.33	0.55
6.	Subsidized group/personal insurance against accident on site	0.40	0.39	0.30	0.36
7.	Transport to and from site	0.85	0.57	0.16	0.52
8.	Provision of protective work devices	0.72	0.58	0.13	0.47
9.	Supervision based on leadership by example	0.82	0.82	0.77	0.80
10.	Safety plan including provision of first aid	0.30	0.26	0.08	0.21
11.	Finish and go (no delay after day's work)	0.43	0.49	0.53	0.48
12.	Provision of recreation and relaxation centers	0.51	0.29	0.07	0.29
13.	End of the year cocktail party and award night	0.74	0.49	0.18	0.47
14.	Love and belongingness	0.71	0.76	0.81	0.76
15.	Job security	0.07	0.13	0.14	0.11

in RI of each category of firms. This result made it possible to examine further the characteristics of RI in each category of firms relative to each other.

Table 2 shows that the management of large construction firms give utmost priority to the provision of working tools and equipment (RI = 0.87) This is followed by the provision of transport to and from site (RI = 0.85) as well as leadership by example (RI = 0.83). The management of the medium firms on the other hand placed highest premium on supervision based on leadership by example (RI = 0.82) followed by love and belongingness (RI = 0.77) and, thirdly, recognition through praise for significant work done (RI = 0.76). The management of the small firms placed highest priority on supervision based on leadership by example (RI = 0.76) This is closely followed by love and belongingness (RI = 0.75) and recognition through praise for significant work done (RI = 0.74).

The highest ranking accorded the provision of working tools and equipment by the management of the large firms is a manifestation of the ability of large construction firms to recognize the advantages of appropriate tools and equipment as major labour-saving devices for productivity improvement. On the contrary, the management of the medium and small firms ranked the provision of working tools and equipment in the fifth and sixth positions respectively. This is a reflection of an earlier postulation by Wahab (1977) that smaller firms in Nigeria are slow at recognizing the advantages inherent in the use of appropriate tools and small equipment in labour intensive construction works. Also, the management of medium and small firms ranked the provision of transport to and from site in the eight and tenth positions respectively as against the second position by the management of large firms. This incentive scheme together with the provision of working tools and equipment involve investment in fixed assets which requires initial capital outlay. But, according to Adeyemi (2000a), smaller firms in Nigeria have added constraints of investing little in fixed assets due to inability to source external funding and limited owner's equity. Hence topmost priority cannot be given to these two schemes by the management of the medium and small firms.

The management of all categories of firms placed very low premium on employee's training and development. From Table 2, the relative index for employee training and development decreases from large firms (RI = 0.55) to the medium firms (RI = 0.36) and to the small firms (RI = 0.17). The ranking of this variable in the thirteenth position by the management of all firms (RII = 0.36) is an indication of the reluctance of Nigerian contractors to train their operatives and it supports the view of Adeyemi (2000b) that lack of training is one of the demotivators to operatives in the Nigerian construction industry.

It is generally observed from Table 2 that the relative index of premium placed on all relevant motivators involving initial capital outlay for the purpose of implementation decreases sharply from the large firms to the small firms. In addition to the provision of working tools and equipment, transport to and from site and employee's training and development, six other relevant motivators involving capital outlay exhibit this diminishing trend by the different categories of firms. They are free medical treatment for workers, end of the year cocktail party and award night, safety plan including provision of first aid, provision of protective work devices, provision of recreation and relaxation centers and subsidized group/personal insurance against accident on site. Except for supervision based on leadership by example and recognition through

praise for significant work done, all other non financial incentive schemes that do not involve any capital outlay for implementation produce subtle increase from the large firms to the small firms.

In effect, it appears that affordability is a prime determinant of premium being placed on each group of non financial incentive schemes by the management of each category of firms surveyed. To test this assertion, it was inferred that where there is no affordability problem, the mean of relative index of premium placed on relevant motivators with, and without initial capital outlay by the management of any category of firm must be the same. The computed mean of the relative index for each of the two groups of incentive schemes (group with and group without capital outlay are therefore subjected to statistical test of significance in each category of firms. Mean RI for the large firm is 0.69 for group of incentive schemes with initial capital outlay while it is 0.54 for the group without any capital outlay. Two tail t-statistics ($t = 1.53 < t_{0.0.25} = 2.16$) indicates that there is no significant difference between the two means. Hence implementation cost is not a significant factor for determining the premium placed on a non-financial incentive scheme in large construction firms. Due to affordability, large construction firms on the average even give higher premium to non financial incentive schemes involving initial capital outlay. Mean RI for the medium construction firms is 0.54 for the group of incentive schemes involving initial capital outlay and 0.60 for the group not involving any capital outlay. Like the large construction firms, t statistics ($t = 0.60 < t_{0.0.25} = 2.16$) indicates that there is no significant difference between the two means. Implementation cost therefore, is not a significant factor for placing premium on a non financial incentive scheme in the medium size construction firms as well. Unlike the large construction firms, however, mean RMI for the group of incentive schemes not involving capital outlay is higher than that of the schemes involving capital outlay.

Mean RI for group of incentive schemes with capital outlay in the small firms is 0.23. This is significantly different from a mean of 0.61 for the group of incentive schemes without any capital outlay ($t = 4.65 > t_{0.0.05} = 2.160$). Therefore small construction firms have absolute preference for non-financial incentive schemes that do not involve capital outlay for affordability reason. This is not unconnected with the low financial status of small construction firms in Nigeria which makes any capital outlay a difficult decision.

The views of the bricklayers is close to that of the management. From Table 3, bricklayers in the large firms placed higher premium on transportation to and from site (RI = 0.85) followed by provision of adequate working tools and equipment (RI = 0.82) and supervision based on leadership by example (RI = 0.82). The bricklayers in the medium firms ranked supervision based on leadership by example highest (RI = 0.82) followed by love and belongingness (0.76) as well as recognition through praise for significant work done (RI = 0.75). The highest priority of the bricklayers in the small firms is love and belongingness (RI = 0.81). This is followed by supervision based on leadership by example (RI = 0.77) and recognition through praise for significant work done (RI = 0.74). The pattern of the bricklayers RI also indicates that small firms have absolute preference for non-financial incentive schemes not involving capital outlay while capital outlay is not an important factor for implementing a non-financial incentive scheme in both large and medium sized construction firms. However the result of the test of independence of assessment between the all-firm RI of management (Table 2) and that of the bricklayers (Table 3) indicates that:

$$t = 3.325 > t_{0.05} = 1.761$$

The assessment of the bricklayers in all categories of firms surveyed is therefore significantly different from that of the management.

Job security was assigned the least importance by both the management and the bricklayers. The average RMI of this incentive scheme is 0.14 for the management (Table 2) and 0.11 for the bricklayers (Table 3). The issue of low priority given to job security might not be unconnected with the cyclical and one-off nature of construction works whereby, according to Kavanagh *et al.* (1978), each new contract requires new management while labour is treated as transient and recruited on ad hoc basis.

The result of the management and the bricklayers level of involvement in the decision to introduce an incentive scheme in their organizations is shown in Table (4) alongside the index of level of involvement. The index of level of involvement (ILI) is defined as:

$$\text{ILI} = \frac{\sum_{i=0}^{n} I_i P_i}{N} \times \frac{1}{100} \qquad (2)$$

where,

I: the extent of premium,

P: the percentage of respondents, and

N: the highest attainable premium

The table reveals that the principal initiator of incentive programmes in all categories of construction firms is the management. The index of level of involvement (ILI) in the decision to introduce an incentive scheme is 3.53, 3.44 and 3.39 for the management in the large, medium and small firms respectively. This is far above the corresponding values for the bricklayers which are 1.41, 1.62 and 1.73.

The fifteen prominent non financial incentive schemes being operated by construction firms in Nigeria correspond to Herzberg's hygiene factors which are:

Table 4 Perception of premium placed on level of involvement of the management and the bricklayers in the introduction of incentive schemes (% of Respondents)

Categories of workers	Large firms						Medium firms						Small firms					
	4	3	2	1	0	ILI	4	3	2	1	0	ILI	4	3	2	1	0	ILI
Management	53	47	0	0	0	3.53	56	32	12	0	0	3.44	54	34	9	3	0	3.39
bricklayers	0	0	59	23	18	1.41	0	15	41	35	9	1.62	9	9	37	36	9	1.73

Extent of Premium: 4 Very much involved; 3 Highly involved; 2 Averagely involved; 1 Rarely involved; 0 Never involved

relation with colleagues, company policy, peer supervision, salary, working conditions, job security, compensation and personal life. With the management of construction firms as the major initiator of these incentive schemes, the views of Herzberg (1968) that management usually place emphasis on hygiene factors and neglects the job enrichment factors is upheld.

Techniques of measuring productivity rate

To determine the technique to be used for measuring operatives productivity on site, the questionnaire sought to know the premium attached to each of the techniques by the management of the three categories of firms. The assessment and relative index (RI) are shown in Table 5. The table indicates that the most popular technique of measuring productivity rate of construction operatives on site is the observation of productivity of the end result of a key activity (for 8 hour day). The relative index for this technique is 0.88 and is used for measuring the bricklayers' productivity.

Site observations and measurements

The result of the site observations and measurements are shown in Tables 6 and 7. When compared across sites, it was discovered that the mean observed outputs of workers in sites I to XX are greater than that of sites XXI to XL. In the bricklaying activities for example, the aggregated means for sites I to XX, (Table 6), are 64 for 225 mm blocks and 68 for 150 mm blocks while the aggregated means for sites XXI to XL, (Table 7), are 54 for 225 mm blocks and 59 for 150 mm blocks. The same trend was observed in other activities as shown in these two tables.

The percentage difference in mean output between the two sites for the five activities measured and the result of the t-tests on the level of significance of the variations are presented in Table 8. The table shows that the percentage difference for laying 225 mm and 150 mm sandcrete blocks are 15.79% and 13.12% respectively. The corresponding figures for other activities are 26.02% for concreting 100–150 mm ground floor slab, 6.41% for floor screeding and 13.32% for plastering of walls. Except for the activity involving floor screeding, the variation of output between the two sites as indicated by the t-statistics are significant.

The significantly higher level of output achieved in sites I to XX could be attributed to increase in the productive time of the bricklayers as idle time is minimized through the non-financial incentive schemes being implemented. The observed psychological impact of the visible incentive schemes being operated on these sites on the bricklayers can be used to substantiate this view. In these sites, bricklayers were provided with all necessary tools and small equipment essentially concrete mixers. The use of concrete mixer accelerated the mixing time of workable concrete and its supply to the bricklayers. Promptness in the supply of the required materials of construction, state-of-the-art tools, finish and go principle and the need to catch the company vehicle at a stipulated departure time led to espirit de corp among the bricklayers.

It was not uncommon to see bricklayers manoeuvering and climbing radiantly and confidently in these sites since they had their protective work overall and head helmets on. In addition they were aware of insurance cover against any major accident. Every operative had good sense of duty making Maslow's theory – Y management possible for site supervisors to adopt. Thus idle time is reduced to the barest minimum in these sites.

Table 5 Relative index of techniques of measuring operatives' productivity rates on site

S/N	Productivity measurement techniques	Large firms	Medium firms	Small firms	All firms
1.	Craftsman survey techniques	0.15	0.32	0.32	0.26
2.	Multi-moment observation of productivityof sub-operations within a cluster	0.36	0.40	0.41	0.39
3.	Observation of productivity of the end result of a key activity (for 8-hours) day	0.88	0.88	0.89	0.88
4.	Work study (activity sampling)	0.57	0.50	0.59	0.55
5.	Time study	0.50	0.49	0.51	0.50

Table 4 Perception of premium placed on level of involvement of the management and the bricklayers in the introduction of incentive schemes (% of Respondents)

Categories of workers	Large firms						Medium firms						Small firms					
	4	3	2	1	0	ILI	4	3	2	1	0	ILI	4	3	2	1	0	ILI
Management	53	47	0	0	0	3.53	56	32	12	0	0	3.44	54	34	9	3	0	3.39
bricklayers	0	0	59	23	18	1.41	0	15	41	35	9	1.62	9	9	37	36	9	1.73

Extent of Premium: 4 Very much involved; 3 Highly involved; 2 Averagely involved; 1 Rarely involved; 0 Never involved

relation with colleagues, company policy, peer supervision, salary, working conditions, job security, compensation and personal life. With the management of construction firms as the major initiator of these incentive schemes, the views of Herzberg (1968) that management usually place emphasis on hygiene factors and neglects the job enrichment factors is upheld.

Techniques of measuring productivity rate

To determine the technique to be used for measuring operatives productivity on site, the questionnaire sought to know the premium attached to each of the techniques by the management of the three categories of firms. The assessment and relative index (RI) are shown in Table 5. The table indicates that the most popular technique of measuring productivity rate of construction operatives on site is the observation of productivity of the end result of a key activity (for 8 hour day). The relative index for this technique is 0.88 and is used for measuring the bricklayers' productivity.

Site observations and measurements

The result of the site observations and measurements are shown in Tables 6 and 7. When compared across sites, it was discovered that the mean observed outputs of workers in sites I to XX are greater than that of sites XXI to XL. In the bricklaying activities for example, the aggregated means for sites I to XX, (Table 6), are 64 for 225 mm blocks and 68 for 150 mm blocks while the aggregated means for sites XXI to XL, (Table 7), are 54 for 225 mm blocks and 59 for 150 mm blocks. The same trend was observed in other activities as shown in these two tables.

The percentage difference in mean output between the two sites for the five activities measured and the result of the t tests on the level of significance of the variations are presented in Table 8. The table shows that the percentage difference for laying 225 mm and 150 mm sandcrete blocks are 15.79% and 13.12% respectively. The corresponding figures for other activities are 26.02% for concreting 100–150 mm ground floor slab, 6.41% for floor screeding and 13.32% for plastering of walls. Except for the activity involving floor screeding, the variation of output between the two sites as indicated by the t-statistics are significant.

The significantly higher level of output achieved in sites I to XX could be attributed to increase in the productive time of the bricklayers as idle time is minimized through the non-financial incentive schemes being implemented. The observed psychological impact of the visible incentive schemes being operated on these sites on the bricklayers can be used to substantiate this view. In these sites, bricklayers were provided with all necessary tools and small equipment essentially concrete mixers. The use of concrete mixer accelerated the mixing time of workable concrete and its supply to the bricklayers. Promptness in the supply of the required materials of construction, state-of-the-art tools, finish and go principle and the need to catch the company vehicle at a stipulated departure time led to espirit de corp among the bricklayers.

It was not uncommon to see bricklayers manoeuvering and climbing radiantly and confidently in these sites since they had their protective work overall and head helmets on. In addition they were aware of insurance cover against any major accident. Every operative had good sense of duty making Maslow's theory – Y management possible for site supervisors to adopt. Thus idle time is reduced to the barest minimum in these sites.

Table 5 Relative index of techniques of measuring operatives' productivity rates on site

S/N	Productivity measurement techniques	Large firms	Medium firms	Small firms	All firms
1.	Craftsman survey techniques	0.15	0.32	0.32	0.26
2.	Multi-moment observation of productivityof sub-operations within a cluster	0.36	0.40	0.41	0.39
3.	Observation of productivity of the end result of a key activity (for 8-hours) day	0.88	0.88	0.89	0.88
4.	Work study (activity sampling)	0.57	0.50	0.59	0.55
5.	Time study	0.50	0.49	0.51	0.50

Table 6 Observed outputs per bricklayer in an 8 – hour day sites I to XX

	ACTIVITIES	UNIT	MEAN	S.D	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX
1.	Laying of 225 mm sandcrete blocks	Nos	64	2.03	65	62	67	–	–	64	–	–	61	–	–	–	–	–	–	63	64	67	–	–
2.	Laying of 150 mm sandcrete blocks	Nos	68	1.34	70	–	–	–	–	68	–	–	66	–	–	–	–	–	–	–	69	68	–	–
3.	Concreting ground floor slab (100 mm – 150 mm thick)	M^3	2.42	0.46	–	–	–	–	–	2.80	–	–	–	–	2.20	–	–	–	–	2.25	–	–	–	–
4.	Floor screeding	M^3	10.30	0.30	–	–	–	–	–	10.19	10.21	–	–	–	–	–	–	–	–	10.50	–	–	–	–
5.	Plastering walls	M^3	9.53	0.15	–	–	–	9.75	–	–	9.32	–	–	–	–	9.50	9.45	–	–	–	–	–	9.64	–

Mean observed outputs = $\frac{\text{Summation of all observed outputs per site}}{\text{Number of men observed}}$. S.D. = Standard Deviation.

Table 7 Observed outputs per bricklayer in an 8 – hour day sites XXI to XL

	Activities	Unit	MEAN	S.D	XXI	XXII	XXIII	XXIV	XXV	XXVI	XXVII	XXVIII	XXIX	XXX	XXXI	XXXII	XXXIII	XXXIV	XXXV	XXXVI	XXXVII	XXXVIII	XXXIX	XL
1.	Laying of 225 mm sandcrete blocks	Nos	54	4.33	–	54	–	–	44	–	–	52	–	53	–	–	62	–	–	–	–	–	–	–
2.	Laying of 150 mm sandcrete blocks	Nos	59	4.36	–	62	–	–	–	–	–	53	–	58	–	–	64	–	–	–	–	–	–	–
3.	Concreting ground floor slab (100 mm – 150 mm thick)	M	1.79	0.15	–	–	–	–	1.80	–	1.70	–	1.90	–	–	–	–	1.75	–	–	–	–	–	–
4.	Floor screeding	M	9.64	0.13	–	–	–	–	–	–	9.50	–	9.92	–	–	–	10.10	9.05	–	–	–	–	–	–
5.	Plastering of walls	M	8.27	0.13	–	–	8.20	8.22	–	–	–	–	–	–	7.99	8.42	–	8.48	–	–	–	–	–	–

Mean observed outputs = $\frac{\text{Summation of all observed outputs per site}}{\text{Number of men observed}}$. S.D. = Standard Deviation.

Table 8 Percentage difference in mean output of bricklayers between sites 1 to XX and Sites XXI to XL

Activities	Unit	Percentage difference in mean output	Two-tail t-test result	Degrees of freedom	Remark
Laying of 225 mm sandcrete blocks	No	15.63	t=9.13 > to.025=2.201	11	Significant
Laying of 150 mm sandcrete blocks	No	13.24	t=5.90 > to.025 = 2.365	7	Significant
Concreting 150 ground floor slab	M^3	26.3	t=4.89 > to.025 = 2.571	5	Significant
Floor screeding	M^2	6.41	t=2.12 < to.025 = 2.571	5	Not Significant
Plastering of walls	M^2	13.2	t=16.33 > to.025=2.306	8	Significant

In sites XXI to XL on the contrary, no provisions were made for the operatives. Bricklayers had to bring their own tools some of which are already obsolete and needing replacement. Concrete is usually mixed by hand and more than often the required consistency for workability is not met. Bricklayers approached their work with extreme caution since they are not protected from accident on site. Lateness to work due mainly to transportation problems, drudgery as a result of faulty tools, incessant rework, conflicts and frustration characterized the activities of bricklayers in these sites. Operatives' frustration in a number of these sites often manifest in visible forms such as:

- Aggression – physical or verbal assault on workmates due to charged emotion.
- Regression – a departure from constructive behaviours to childish acts such as hissing, singing, dancing, throwing pebbles and kicking objects around.
- Fixation – a tendency to create time for unproductive activity such as prolonged washing of tools, re-adjusting shoes and clothes frequently, going into isolation to smoke, scribbling graffiti on walls, attending toilet frequently and occasional novelty boxing, wrestling or football contest on site.

In effect, idle time is on the increase and productivity suffers. It is in this set of sites that supervisors adopt Maslow's theory – X management as a panacea to get construction operations going. The variations found in the outputs of bricklayers between the two sets of sites were therefore a result of high level of motivation leading to high morale and comradeship in one, and lack of motivation resulting in low morale and individualism in the other.

Conclusions

An analysis of the impacts of non-financial incentive schemes being operated by some contractors in Nigeria on bricklayers' productivity has been performed. The study concludes that:

i. Non-financial incentive schemes are preferred as methods of motivating operatives in the Nigerian construction industry than financial incentive schemes.
ii. The premium placed on variables of non-financial incentive schemes differ significantly across firm categories. This premium decreases from large firms to small firms. In addition small firms are more interested in non-financial incentive schemes that do not involve initial capital outlay.
iii. The management of all categories of construction firms in Nigeria are the major initiator of incentive schemes and their emphasis is placed on schemes corresponding to Herzberg's hygiene factors.
iv. Application of non-financial incentive schemes increases the productive time of bricklayers and consequently enhances productivity. These schemes are responsible for 6 to 26% increase in outputs on bricklaying and concreting activities measured on site.

References

Adams, J.S. (1963) Towards an understanding of inequity. *Journal of Abnormal and Social Psychology*, **67**, 422–36.

Adeyemi, A.Y. (2000a) Equipment policy of construction contractors. *The Journal of the Federation of Construction Industry*, **15**, 19–27.

Adeyemi, A.Y. (2000b) Management prescriptions for productivity improvement on mass housing projects, in Akinbamijo, O.B., Fawehinmi A.S., Ogunsemi, D.R. and Olotuah, A. (eds) *Effective Housing in the 21st Century Nigeria*, The Environmental Forum, Akure, Nigeria, pp. 63–74.

Ayandele, J.O. (1996) Evaluation of factors that affect labour productivity of some selected building trades on Nigerian construction sites. Unpublished Ph.D Thesis, University of Lagos, Nigeria.

Borcherding, J.D. (1976) Improving productivity in individual construction. *Journal of the Construction Division*, ASCE, **102**, 599–614.

Borcheding, J.D. Sebastian, S.J. and Samelson, N.M. (1982) Improving productivity on large projects. *Journal of the Construction Division*, ASCE, **106**, 73–89.

Callahan, M.T. (1984) Construction productivity improvement techniques, in Handa, V.K. (ed.) *Organizing and Managing of Construction, CIB W-65*, International Council for Building Research Studies and Documentation, Canada, pp. 537–46.

Choromokos, J. and Mckee, K.E. (1981) Construction productivity improvement. *Journal of the Construction Division*, ASCE, **107**, 35–48.

Herzberg, F. (1968) One more time: how do you motivate employees. *Havard Business Review*, **46**, 53–62.

Kavanagh, T.C., Muller, F. and O'Brien, J.J. (1978) *Construction Management – A Professional Approach*, McGraw-Hill Inc, New York.

Khan, M.S. (1993) Methods of motivating for increased productivity. *Journal of Management in Engineering*, ASCE, **9**, 148–53.

Koehn, E. and Cook, R. (1987) Construction site operations perceptions influencing productivity, in Lansley, P.R. and Harlow, P.A. (eds) *Managing Construction World-Wide, CIB W-65, The Organization and Management of Construction*, E. & F.N. Spon, London, pp. 989–1000.

Lewis, T.M. (1987) Is productivity a problem?, in Lansley, P.R. and Harlow, P.A. (eds) *Managing Construction World-Wide, CIB W-65, The Organization and Management of Construction*, E. & F. N. Spon, London, pp.778–87.

Maloney, W. F. (1983) Productivity improvement: the influence of labour. *Journal of Construction Engineering and Management*, ASCE, **109**, 321–34.

Nwachukwu, C. C. (1988) *Management. Theory and Practice*, African FEP Publishers, Onitsha, Nigeria, pp. 218–21.

Ogunlana, S.O. and Olomolaiye, P.O. (1992) Construction workers productivity: lessons for Asian countries. *Better Quality of Work Life Through Productivity*, International Productivity Congress, ASEAN Productivity Office, Tokyo, pp. 213–25.

Olomolaiye, P.O. (1990) An evaluation of the relationship between bricklayers motivation and productivity. *Construction Management and Economics*, **8**, 301–13.

Olomolaiye, P.O. and Price, A.D.F. (1989) A review of construction operative motivation. *Journal of Building and Environment*, **24**, 279–84.

Olubodun, O. (1986) Framework for Construction Costs Minimization in Southwestern Nigeria. Unpublished M.Sc. Thesis, Department of Building, Obafemi Awolowo University, Ile Ife, pp. 15–20.

Wahab, K.A. (1977) A system for stimulating the productivity of Nigerian contractors. *Nigerian Journal of Business Management*, pp. 57–61.